NEW BRUNSWICK FOREST LAND HABITAT MANAGEMENT PROGRAM

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FOREST LAND HABITAT MANAGEMENT IN NEW BRUNSWICK

PROGRESS REPORT

Fish and Wildlife Branch
Department of Natural Resources and Energy
Fredericton, New Brunswick
E3B 5H1

Submitted to

WILDLIFE HABITAT CANADA

9 October 1990

EXECUTIVE SUMMARY

The New Brunswick Department of Natural Resources and Energy has requested that Licensees investigate the potential of two-pass clear-cut and selection harvest systems and that they incorporate specific strategies for management of mature coniferous habitat during development of the 1992 Forest Management Plans for Crown Land. Objectives for mature coniferous habitat will be based upon the habitat requisites of white-tailed deer and American marten. Two new forest projection models are being developed, under contract, to allow simulation of the various types of harvest, and integration of habitat requirements. These new models are to be ready for development of the 1992 Management Plans.

Inclusion of Habitat Supply Analysis in forest management planning for Crown Land will be a new process for 1992. All procedures must be defined and implementable by early 1991, when the Licensees begin plan development. To test the process, the Forest Land Habitat Management Program and Timber Management Branch have jointly begun the process of developing a trial Forest Management Plan. The Upper Miramichi Crown Land License, an area of 400,000 hectares, is being used for the trial. The exercise has helped refine habitat supply analysis in the following ways. A method of simulating the natural regeneration of unharvested stands was defined and implemented. Stand structure data from field studies were used to define deer winter habitat for areas under both even- and uneven-aged management. A procedure was developed to determine what portion of the mature coniferous forest meets the spatial criteria of marten habitat.

The Trial Management Plan is not yet complete. A series of license-wide model runs have been made to determine mature coniferous habitat levels associated with maximizing 80-year sustainable timber supply in a clear-cut harvest scenario. Results indicate that habitat abundance will decline significantly within 35 years, and will not improve significantly thereafter. It is likely that uneven-aged management can be used to increase habitat abundance.

White-tailed deer winter habitat requirements will be an important part of the 1992 Management Plans for Crown Land. A database was established to identify the location

of deer wintering areas on Crown Land in the Province. In total, 886 deer wintering areas, totalling 200,000 ha, have been identified. Deer Wintering Area Management Units are areas that will be managed to provide a sustained yield of winter shelter habitat. The management units are being established in association with areas of known winter use and contain forest stands currently utilized by deer and stands that are capable of providing habitat in the future.

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FOREST LAND HABITAT MANAGEMENT IN NEW BRUNSWICK

The goals of New Brunswick's Forest Land Habitat Management Program (FLHMP) are to define habitat objectives for Crown land that will accommodate desired wildlife population levels and to integrate habitat objectives into the forest management planning process for Crown land in New Brunswick.

The 5-year program is co-sponsored by the New Brunswick Department of Natural Resources and Energy and Wildlife Habitat Canada. This document is the fourth semiannual Program Progress Report submitted to Wildlife Habitat Canada.

INTRODUCTION

Habitat supply analysis (HSA) for mature coniferous forest will be a component of the upcoming 1992 Forest Management Plans for Crown Land in New Brunswick. As discussed in the March 1990 progress report, analyses of 1987 Forest Management Plans indicated a significant overall depletion of mature coniferous forest within 30-50 years. There is a legislated responsibility to maintain sufficient habitat to ensure that no wildlife species are at risk. Mature and overmature (mature) coniferous forest provides unique structural features; it is the required or preferred habitat of a variety of wildlife species. Habitat supply analysis for mature coniferous habitat will be based on the habitat requirements of the American marten and on the winter habitat requirements of the white-tailed deer. Habitat supplies for black-backed woodpecker and brown creeper will be monitored.

The 1992 Forest Management Plans for Crown Land will be developed by the Crown Land License holders (Licensees) through 1991, to be submitted in 1992. The inclusion of wildlife habitat goals in forest management planning is a new process. The methodology for the process is being developed by the Forest Land Habitat Management Program (FLHMP), in coordination with the Forest Management Planning Section (FMPS) of Timber Management Branch. Inclusion of HSA in plan development obliges the FLHMP to have the appropriate HSA procedures defined and operational by early 1991. Development of procedures has been ongoing, and is detailed in this report.

FOREST LEVEL MANAGEMENT AND MODELS

For the most part, Crown Land forest in New Brunswick has been managed under an even-aged system; the management objective has been to maximize sustainable timber harvest. Management planning exercises have been conducted using an even-aged forest management model (FORMAN) which simulates only clear-cut harvest. The Department of Natural Resources and Energy (DNRE) has requested that Licensees investigate the potential of two-pass clear-cut and selection harvest systems and develop specific strategies for management of mature softwood habitat during development of their 1992 Forest Management Plans (Appendix 1). Accordingly, additional forest-level modelling capabilities are being developed. DNRE has contracted out the development of two new forest level models, an improved even-aged model and an uneven-aged model. These two models are to be available for use by the Licensees for development of 1992 Management Plans. The additional modelling capabilities will increase the habitat supply options as well as offer better modelling of current forest management practises.

The new even-aged forest projection model will allow simulation of two-pass, multi-pass, and conventional single-pass harvest. Other improvements over FORMAN are (1) an option for commercial thinning, (2) an increase in options for planting and pre-commercial thinning and, (3) the capability to report habitat variables.

The uneven-aged forest projection model will allow simulation of selection harvest. Selection harvest can be used to maintain stand structures indefinitely, while allowing a regular removal of timber products. Only those forest strata dominated by spruce or tolerant hardwoods (e.g., maple, beech) are considered suitable for this system (see Appendix 2 for forest class definitions). The basis of the uneven-aged model is a dynamic stand table (number of stems by diameter class by species) for each modelled forest class. Inputs to the model include basal area (BA) at which entry (harvest) is permitted, and proportion of BA that can be removed per entry. Habitat will be defined as ranges of stem density and of average stem diameter; the model will report habitat abundance at each iteration. A preliminary version of the model is currently available and has been used to explore management options.

FOREST MANAGEMENT PLANNING EXERCISE

The FLHMP and the FMPS have jointly begun the process of developing a management plan for a specific license in order to test procedures for the integrated analysis of timber and habitat supplies. The planning horizons are the same as those proposed for 1992 Forest Management Plans: 80 years for the forest-level analysis and 25-35 years for the spatial analysis of harvest operations. The Upper Miramichi Crown Land License, an area of 400,000 hectares, is being used for the trial. Existing data were used where available, including the forest description from the 1987 Upper Miramichi Forest Management Plan.

The following tasks were undertaken as components of plan development:

1. Refinement of timber yield relationships to account for regeneration of unharvested stands.

2. Refinement of habitat relationships to account for stand conditions resulting from all potential interventions.

3. Identification of the areas in buffer strips, inaccessible areas and legal reserves so as to define the available forest.

4. Development of procedures for spatial assessment of habitat supply.

Expected benefits of the development of a trial Plan are the identification of realistic habitat goals, and the explicit definition of trade-offs between timber and habitat supply. Preliminary results will aid in the formulation of Departmental objectives for the 1992 Forest Management Plans.

REGENERATION OF UNHARVESTED STANDS

The even-aged wood supply model (FORMAN) is based on a series of yield curves describing temporal changes in wood volume for groupings of similar stands (Forest Classes, see Appendix 2 for forest class definitions). Volume increases during the REGENERATING and IMMATURE stages, is relatively stable during the MATURE stage, and decreases during the OVERMATURE stage (Appendix 2). The version of FORMAN used

for 1987 planning did not allow for the regeneration of unharvested stands. Although stands that escaped harvest (aged beyond operability) no longer contributed to the tally of merchantable volume, they continued to increment in age until they reached the oldest age class, where they remained. Errors in calculated merchantable volume, as a result of not allowing stands to regenerate, were likely insignificant as only stands available for harvest contributed to the modelled landbase and few stands were allowed to escape harvest.

The modified version of FORMAN, used to simultaneously monitor timber and habitat supplies, is run on the entire forest, rather than on only the component available for harvest, as habitat is also supplied by forest unavailable for harvest (e.g., riparian buffers, steep slopes, ecological reserves). Potential errors in reported habitat abundance, as a result of not allowing unharvested stands to regenerate, were unacceptable. To address this, Forest Development Survey and Permanent Sample Plot forest inventory data were used to determine, for each forest class, the average age at which regeneration occurs in unharvested stands, the species composition of the regeneration component, and the time required for the regeneration component to yield merchantable volume. These data were used to build a regeneration function for FORMAN; unharvested components of forest classes are now reassigned to new yield curves when the regeneration component first yields merchantable volume. Regeneration of an unharvested forest class is illustrated in Figure 1.

HABITAT RELATIONSHIPS

White-tailed Deer

Information from ongoing field studies is being used to define winter habitat for areas under both even- and uneven-aged management. The intent of studies has been to determine the structure of stands used by deer during winter by associating intensity of deer use with stand structure. Structural variables used include stand age, forest unit (overstory species composition), vegetation type (floristic composition, including understory), treatment unit (measure of site quality), coniferous stem density and average coniferous stem diameter.

Analyses of field data indicated which forest classes were selected by deer, and over what range of ages they were selected. This information was used to define criteria for white-tailed deer winter habitat under an even-aged forest management system. Strata selected by deer showed a wide

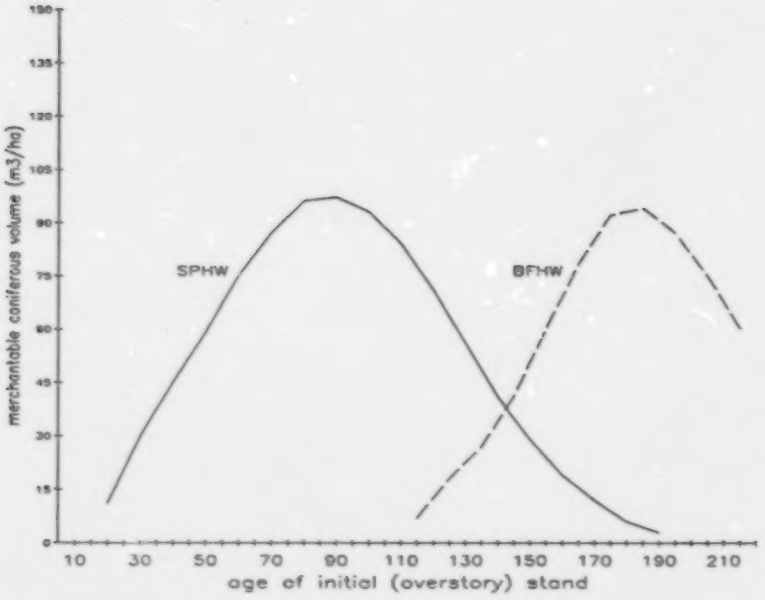

Figure 1. Merchantable coniferous volume yield of a spruce-hardwood stratum (SPHW) with balsam fir-hardwood (BFHW) regeneration.

range of within-stratum variability in use. Based on within-stratum variability, classes were assigned a probability of use. Forest strata considered suitable for deer winter habitat in the even-aged component of the trial planning exercise are given below. They are not necessarily final for the 1992 Management Plans as further data will be collected during the winter of 1990-91. Suitable strata are: spruce-dominated mixedwood classes at ages 60-110 ($\underline{P}$ = 0.40), spruce-dominated coniferous classes at ages 70-110 ($\underline{P}$ = 0.95) and 110-120 ($\underline{P}$ = 0.50), balsam fir-dominated mixedwood classes at ages 50-70 ($\underline{P}$ = 0.60), balsam fir-dominated coniferous classes at ages 50-70 ($\underline{P}$ = 0.95) and 70-100 ($\underline{P}$ = 0.65) and eastern white cedar-dominated classes at ages 70-110 ($\underline{P}$ = 1.0). An example of winter habitat windows for white-tailed deer is given in Figure 2.

Analyses of field data have also indicated preferences by white-tailed deer for certain ranges of coniferous stem density and of average coniferous stem diameter. These preferences, in combination with forest class preferences, were used to define habitat criteria under an uneven-aged forest management system. The uneven-aged model tracks the composition of each forest class, in terms of number of stems by diameter class by species. Habitat criteria will

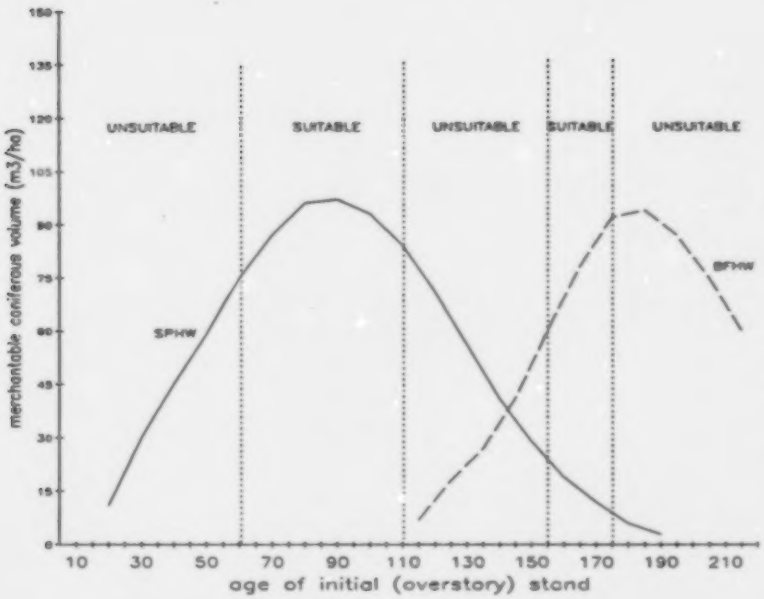

Figure 2. White-tailed deer winter habitat windows for a License 4 spruce-hardwood stratum (SPHW) with balsam fir-hardwood (BFHW) regeneration.

be a user-controlled input to the model; model output will include area under uneven-aged management that is suitable for winter habitat at each 5-year iteration. Final criteria for deer winter habitat under an uneven-aged system cannot be defined in isolation of estimates of current conditions or of functions describing expected growth, and therefore must await availability of the completed model.

Marten

Within FORMAN, the times over which suitable classes contribute to habitat are defined by "windows" on the coniferous volume yield curves of suitable forest classes. In previous analyses of marten habitat supply, the windows were open-ended, in that classes became suitable once beyond a certain age and remained suitable indefinitely if harvest did not occur. There has been no documentation of changes in marten use of stands as overstory break-up progresses. However, information on marten habitat requirements and predictions of structures of stands experiencing overstory break-up indicate a likelihood that decline in marten use over time will occur in very old stands. Marten habitat windows were therefore revised to reflect this. The criteria for marten habitat for areas under even-aged management are given below. These are being used for the

trial planning exercise and are the likely final definitions for the 1992 Forest Management Plans.

Forest classes suitable for marten are those meeting the criterion of maximum coniferous volume ≥60 m^3/ha, excluding those classes dominated by pine species. This essentially causes all non-pine, coniferous-dominated classes to be included, with the exception of those of low productivity (e.g., spruce bogs). The times over which suitable classes contribute to habitat are defined by the habitat windows. For each class, the window is from the point on the increase component of the curve where coniferous volume = 86% of maximum coniferous volume (MCV) to the point on the decrease component where coniferous volume = 30% of MCV. The 86% MCV point is an estimate of when the MATURE development stage begins; the 30% MCV point is an estimate of when 30% of coniferous crown closure remains. All area meeting marten habitat criteria is considered of equal value. An example of habitat windows for marten in given in Figure 3.

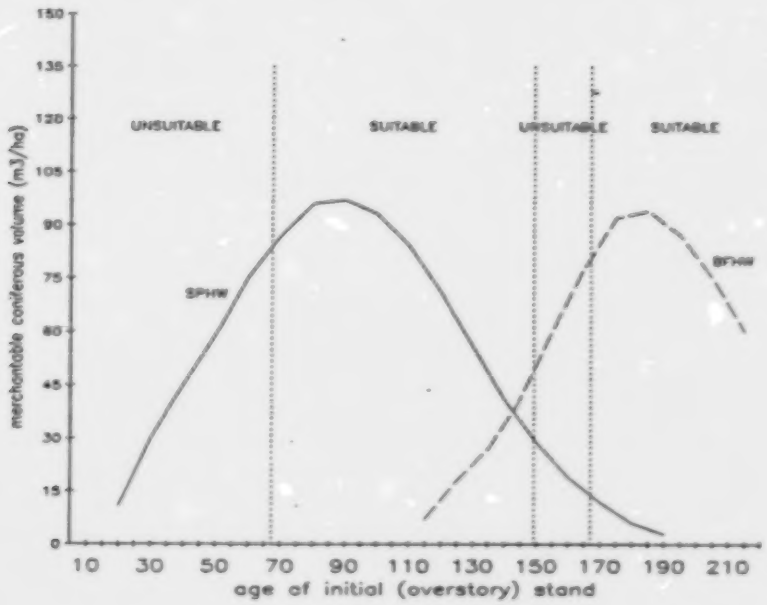

Figure 3. Marten habitat windows for a License 4 spruce-hardwood stratum (SPHW) with balsam fir-hardwood (BFHW) regeneration.

Criteria for marten habitat under an uneven-aged system will be defined in a manner similar to that used for white-tailed deer. Empirical data on the ranges of stem density and average stem diameter suitable for marten are not

available; forest inventory data on the ranges that occur naturally within forest strata used by marten will therefore be used to define habitat parameters.

LAND AVAILABILITY

Calculation of annual allowable timber harvest is based on productivity estimates (volume yield) of the available forest landbase. Legal reserves, inaccessible areas and riparian buffers reduce the area of forest land that is available for management to something less than the forest area of the license. Error in estimates of land availability or of land productivity can cause allowable harvest rates to be unrealistic.

Areas in reserve (unavailable) forest, particularly buffer strips, were estimated during the development of the 1987 Forest Management Plans; productivity in the reserve forest was assumed to equal average productivity estimated from across the general forest. This proved erroneous in two respects: buffer strip widths used for planning were smaller than those eventually applied on the ground, and productivity in buffer strips was higher than estimates of average productivity, due to their riparian association. This led to overestimates of annual allowable harvests, and hence to overharvest of the landbase.

The solution was to determine (1) the projected locations of buffer strips, (2) their projected widths, and (3) the composition and age class structure of the forest within them. The FMPS developed procedures to use the Geographic Information System (GIS) to draw buffers at designated widths around watercourses, and to assess buffer strip contents. The FLHMP used operations data from all harvest operations from 1987 to 1989 to determine average buffer widths assigned to the various watercourse features (streams, rivers, lakes). The average widths are being applied to the appropriate watercourse features for the trial management plan. Advantages to the process are that (1) it allows exploration of the effects of varying buffer strip width on both timber and habitat supplies, (2) it creates a database from which to plan specially prescribed harvest in buffer strips and, (3) it allows a more realistic calculation of allowable harvest rates.

SPATIAL HABITAT MODELLING - GROSS AND NET HABITAT SUPPLIES

Non-spatial monitoring of habitat supply can yield erroneous results, particularly for species with large area requirements, such as marten. FORMAN tracks the combined

area of all stands meeting marten habitat criteria (GROSS habitat), without consideration of stand size or degree of isolation from other suitable stands. To address this problem, the FLHMP developed procedures to assess whether stands contributing to gross habitat also meet spatial requirements. Stands that are within habitat patches of an appropriate size, and that otherwise meet habitat criteria, are designated as NET habitat. The calculation of net habitat is repeated after each of the first seven 5-year iterations of the model, to account for changes due to logging and stand development. Projected shortages in net habitat can be analyzed to determine the relative influences of reduced habitat abundance and poor spatial arrangement.

RESULTS OF TRIAL ANALYSES

As a component of the trial management planning exercise, habitat supply analyses have been undertaken for mature coniferous habitat. The FORMAN model was used to model habitat supply from the landbase identified for even-aged management. A draft version of the uneven-aged model was used to quantify timber yields from forest classes undergoing selection harvest; the degree of error in reported volumes is therefore unknown. Stands undergoing selection harvest are assumed to remain in a perpetual habitat condition; reported habitat abundance is therefore not affected by error within the model.

Harvest priorities used for initial FORMAN runs were to minimize coniferous volume loss resulting from stand decadence and to maximize coniferous volume harvested. These are standard timber harvest priorities; habitat supplies are therefore fallout from intensive management for timber.

The general result of analyses conducted thus far is that gross habitat supply from a forest under even-aged management declines sharply to year 40 and increases slowly thereafter (Figure 4, clear-cut harvest). The sharp decline is a result of the priority harvest of stands that are losing wood volume through decadence; these same stands supply habitat for marten. The decline ceases at year 40 because all older classes of coniferous-dominated forest in the regular forest have been harvested; 10% of the coniferous-dominated forest is in reserve areas and continues to supply habitat. The lack of significant recovery after year 40 is due to the expected rotation age of 40-50 years; stands will be harvested before they begin to supply habitat.

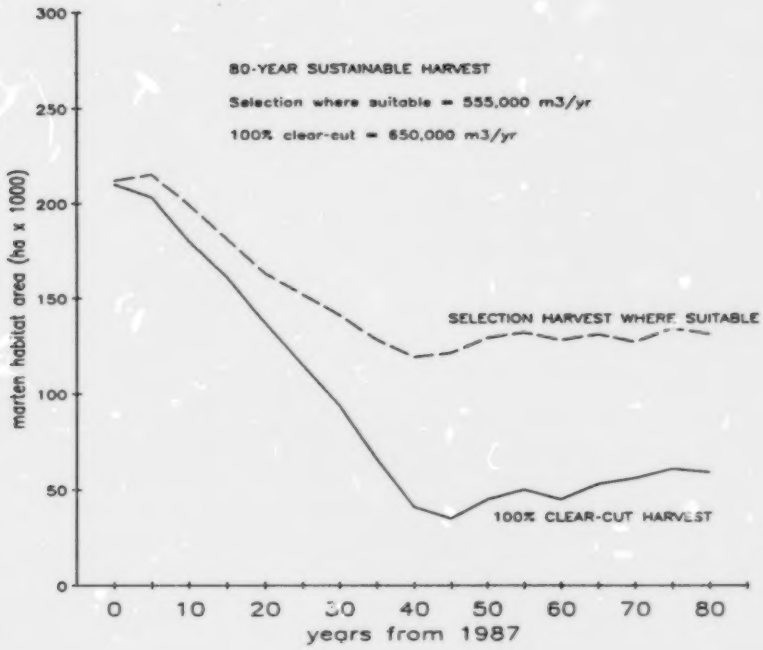

Figure 4. Influence of use of selection harvest on marten habitat supply on the Upper Miramichi Crown Land License. Twenty-seven percent of the coniferous forest is suitable for selection harvest.

Twenty-seven percent of the coniferous-dominated forest is considered suitable for selection harvest. When the candidate stands were harvested using a selection system, decline in habitat was more gradual than when they were clear-cut and the level at which the decline ceased was considerably higher (Figure 4). This is because stands are perpetually suitable as habitat when selectively harvested at prescribed rates.

As previously discussed, procedures are available for assessing net habitat abundance for marten over the first 35 years of the plan. Net habitat abundance provides a more realistic estimate of area that is available to the species. The analysis indicated a virtual elimination of habitat at year 35 (Figure 5). The decline of net habitat abundance is a result of both a declining gross habitat abundance and an increasing isolation of remnant suitable stands.

In the absence of active management for marten habitat, the scenario most likely to occur is the NET run in Figure 5. Two management options exist to ensure the

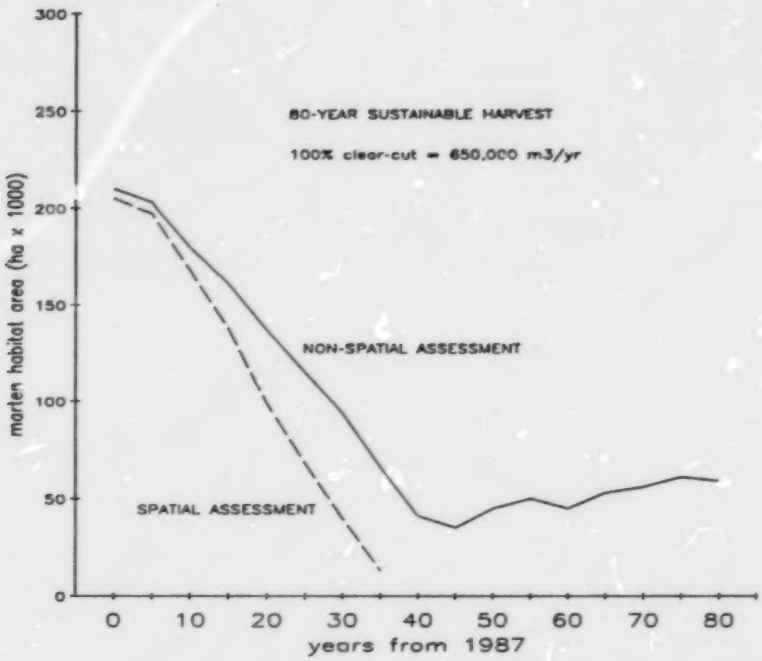

Figure 5. Predicted area of all stands meeting structural marten habitat criteria (GROSS habitat), and of habitat meeting spatial criteria (NET habitat) on the Upper Miramichi Crown land License. Harvest is by clear-cut.

maintenance of habitat: uneven-aged management and even-aged management with sufficiently long rotation ages. The portion of the forest to which either or both of these need to be applied depends on habitat goals for the landbase.

FOREST OPENING SIZE AND ADJACENCY GUIDELINES

To date, HSA procedures have been developed to control mature coniferous forest habitat, and deer wintering area habitat. These priorities were based on the projected depletion of these older forest types in the foreseeable future. Habitat relationships for species that prefer young successional stages have not been defined, due to a predicted abundance of young forest. HSAs for these types are therefore precluded for the 1992 Forest Management Plans, such that desired abundance and spatial arrangement of these types will not be defined as explicit forest-level objectives. In the interim, opening size and harvest block adjacency guidelines will be adapted to reflect current understanding of general wildlife-habitat relationships.

Current guidelines limit clear-cut size to 125 ha, and prohibit the harvest of stands adjacent to cutovers until regeneration in the cutover reaches a 5 year standard for plantations. These guidelines were developed for timber production purposes; little attempt was made to integrate wildlife habitat objectives.

Forest openings created by clear-cutting are of value to wildlife primarily as forage areas. The extent of utilization (effective size), however, is limited for many species by the distance from adequate hiding cover that animals are willing to forage, such that large cuts are not fully used. Shape can also be manipulated to increase edge and alleviate decreases in effective size as cut size increases. The harvesting of blocks adjacent to cutovers will increase opening size unless regeneration is sufficient to provide hiding cover (a structural difference meaningful to wildlife).

Opening size and adjacency criteria are being addressed with respect to wildlife habitat using the following outline:

1. Determine which species select stands in early successional stages.

2. Define early successional habitat for these species in terms of:

1. stand structure (tree species composition, stem density, and stand height) suitable for hiding cover,

2. age or height of regeneration at which use becomes common,

3. type of use (browse or cover), and

4. season of use.

3. Determine proportion of opening that will be used, i.e., how far from cover will animals forage?

4. Compare parameters in (2) and (3), above, among species to determine the most restrictive requirements.

This process is providing a basis from which to increase the relevance of the guidelines to wildlife. Opening size criteria will include a range of cut sizes, based on the home range size and extent of browse utilization of a variety of wildlife species that inhabit early successional stage forest. The guidelines will ensure that height and density of regeneration provide hiding cover for big game species. Although the guidelines will not address the forest-level dispersion of habitat types and age classes directly, they will provide building blocks for doing so.

WHITE-TAILED DEER WINTER HABITAT MANAGEMENT

As reported in the March 1990 Progress Report, the location of all known deer wintering areas (DWA) on Crown land have been entered into the GIS database. Eight hundred and eighty-six DWAs, totalling 200,000 ha, have been identified. DWAs within the database range in size from 20 to 5,000 ha.

A deer wintering area management unit (DWAMU) is an area for which the forest management objective is to provide a sustained yield of winter shelter habitat over time. DWAMUs are being established in association with areas of known winter deer use and contain forest stands currently utilized by deer for winter habitat and stands that are capable of providing winter habitat in the future. Initial DWAMU boundary establishment is complete for Crown Timber Licenses 3, 4 and 5. Initial boundaries will be reviewed with the associated DNRE regional and licensee staff prior to being finalized for the 1992 Forest Management Plans.

The objective for each Crown Timber License and for each DWAMU will be to provide an abundance of winter shelter that is equal to current (1980s) levels and that is sustainable over the long term. Current levels are defined as the total area of stands within DWAs that currently have structures capable of providing winter shelter.

The responsibilities and requirements of DNRE and Crown Timber Licensees for 1992 Forest Management Plan development were discussed at the March 1990 meeting of the Wildlife Technical Committee of the New Brunswick Forest Research Advisory Committee. DNRE will establish DWAMU boundaries, provide objectives for long-term shelter habitat, provide a structural definition of shelter habitat, and provide guidelines for DWAMU management and operating plan development. The Licensees will apply HSA to all their DWAMUs combined to derive forecasts of habitat availability and allowable annual harvest that achieve long-term habitat objectives, and will develop individual management plans, including proposed harvest block identification by treatment and period, for a portion of the DWAMUs on their license.

COORDINATION WITH EXTERNAL AGENCIES

CANADA/NEW BRUNSWICK COOPERATIVE AGREEMENT ON FOREST DEVELOPMENT

A proposal has been submitted to the coordinating committee of the Canada/New Brunswick Cooperative Agreement on Forest Development (Appendix 3). The proposal is for funding to engage biologists that will assist Licensee foresters and DNRE regional staff with the implementation and evaluation of habitat supply analysis procedures.

WILDLIFE TECHNICAL COMMITTEE

At the March 1990 meeting of the Wildlife Technical Committee (WTC) of the New Brunswick Forest Research Advisory Committee (Appendix 4), a need was identified to describe the framework by which the WTC will advise on priorities for applied wildlife research in New Brunswick. Members have since met several times to discuss the topic. The document "A Framework For Applied Wildlife Research" is the result of those discussions (Appendix 5).

NEW BRUNSWICK
FOREST WILDLIFE HABITAT PROGRAM

BUDGET EXPENDITURES

1 APRIL 1990 - 30 SEPTEMBER 1990

ACTIVITY	CONTRIBUTOR	
	D.N.R.E.	W.H.C.
Salaries and Benefits	92,444	58,924
Travel and Activity Expenses	6,937	805
Vehicles and Equipment	24,927	3,222
Professional Services, Materials and Supplies	3,590	362
Computer Hardware, Software and Support	224	0
TOTAL	128,122	63,313

GRAND TOTAL = D.N.R.E. + W.H.C.

= 191,435

APPENDICES

APPENDIX 1.

CROWN LICENSE FOREST MANAGEMENT PLANNING PROCESS

Thom Erdle
Mike Sullivan
July 10, 1990
Doc. #1255D

CROWN LICENSE FOREST MANAGEMENT PLANNING PROCESS

INTRODUCTION

Under the recently approved Licensee Evaluation Criteria, reference is made to minimum management planning procedures which must be met for license management plans to be accepted by the Department of Natural Resources and Energy. This document details those requirements and the time table in which they fit so that all parties are informed of what must occur over the next three years. This document is a draft, since licensee and departmental input will be required to shape the contents into a final version which will result in practical and effective strategies for responsible management of the Crown forest resource.

The forest management planning process is comprised of two phases. First is the evaluation of management alternatives for the purpose of selecting an appropriate strategy. Second is geographic lay-out of that strategy for purpose of implementation. Both phases must be satisfactorily performed for the licensees' plan to be deemed acceptable.

The attached material describes in detail the management planning requirements, and should be referred to for clarification. However, in concise terms, phase one of the planning effort will be deemed acceptable if all the following steps are performed:

(1) the licensee provides the resource information listed as his responsibility in Table 1;
(2) stand level forecasts are made using DNR approved models for the five conditions listed in Table 2;
(3) stand development is characterized by the parameters listed in Table 3;
(4) each stand on the license is characterized (classified) for all biological and physical conditions listed in Table 4;
(5) a computer readable file of the Table 4 classification results is supplied to the Department;

(6) DNR approved forest level models are employed to analyse even and uneven-aged management for the stand types listed in Table 4a;
(7) forest level analyses are performed which explicitly include the biologically feasible range of inputs listed in Table 5;
(8) forest level results for each combination of Table 5 inputs are expressed for each of the indicators listed in Table 6 and;
(9) the licensee provides to DNRE three suggested strategies in decreasing order of preference in the format identified in paragraph one under Management Evaluation Process.

The geographic lay-out for strategy implementation will be deemed acceptable if the licensee:

(1) lays out and characterizes the harvest schedule as described in Table 7 for a minimum of 25 years or until such time as the point of minimum softwood growing stock is reached up to a maximum of 35 years;
(2) identifies spacing and commercial thinning areas for the first 5 years;
(3) sequences blocks for harvest based on the criteria listed in Table 8 and;
(4) describes the impact of the mapped strategy for all indicators listed in Table 6.

Execution of the two phases of the management planning process must be performed in sequence and evaluation of both steps will made upon submission of each phase as they are completed. The management alternatives (phase one) will be submitted and an appropriate strategy selected prior to proceeding with geographic lay-out (phase two). If both phases are accepted, the licensee management planning performance will be acceptable in the context of the Licensee Performance Evaluation criteria. If the licensee disagrees with DNRE evaluation of <u>either</u> or <u>both</u> phases of management planning he has the recourse of appealing for independent review as stipulated on page 3 of the Evaluation Criteria.

BACKGROUND

The 1992 management planning effort will differ from past efforts in three respects. First, it will capitalize on additional resource information acquired over the past few years. Second, it will introduce new stand and forest level planning concepts which overcome short-comings identified in previous efforts. Finally, it will incorporate more thorough consideration of a broader base of resource issues and management alternatives and opportunities. This broader base of resource issues will specifically include:

(1) consideration of partial harvest and uneven-aged management regimes for appropriate hardwood and softwood stand types;
(2) expanding silviculture alternatives to include commercial thinning;
(3) development of specific strategies for management and maintenance of deer wintering areas;
(4) development of specific strategies for management of mature softwood habitat;
(5) thorough analysis of hardwood supply problems and opportunities;
(6) analysis of product quality in terms of average tree size;
(7) thorough and systematic presentation of management alternatives and justification of chosen strategies.

By responding to changes in resource data, improved understanding of the resource, and pertinent resource issues, the 1992 plans should make for continued improvement in the management of the Crown forest. The following sections outline in general form the management planning process, and the nature of the component steps. The specific technical detail necessary to implement those steps will not be discussed here, but will be jointly defined by the Department and licensees over the course of 1990. As for the 1987 plans, the described planning process represents the minimally acceptable approach and it is anticipated that licensees will strive for significant acheivement beyond the minimum standards.

PLANNING STEPS AND TIMETABLE

The 1992 forest management process for Crown Licensees will involve six fundamental steps:

(1) Data acquisition and data-base loading;
(2) Forest characterization using completed data-base;
(3) Stand level forecasting (methodology and execution);
(4) Forest level forecasting methodology (methodology and execution);
(5) Management design and evaluation (methodology and execution);
(6) Geographic lay-out and evaluation of final strategy.

The general schedule by which these tasks are to be accomplished is as follows:

1990 March-December:
(a) data acquisition and data-base loading;
(b) methodology for stand and forest level forecasts;
(c) management design methodology.

1991 January-August:
(a) forest characterization;
(b) execution of stand and forest level forecasts;
(c) management plan development.
(d) strategy proposal and selection.
(e) DNRE approval of final strategy.

1991 September-March (1992):
(a) geographic lay-out;
(b) harvest block sequencing;
(c) final evaluation of geographic lay-out.

1992 April:	(a) management plan submission to DNRE.
1992 May-November:	(a) management plan evaluation by DNRE; (b) 1987-1992 implementation performance evaluation by DNRE.
1993 April:	(a) implementation of first operating year of management plan.

DATA ACQUISITION AND DATA-BASE LOADING

This step involves getting all aspects of the forest inventory up-to-date and in proper order, adding new information required to support the key aspects of plan preparation, and getting all data in computer readable form so it is available for licensees' use by January 1991. Two general types of data are required: (1) biological forest description, and (2) land availability classification. Table 1 outlines the particulars of each type of data in terms of source, responsibilities for acquisition and loading, and target completion dates.

Specifically, the licensees' responsibilities include mapping out areas of harvest inaccessability (on 1:50 000 topographic maps), conducting complete 5th year surveys, timely submission of annual reports, and implementation of aerial/ground survey for pre-1982 cut-over and regenerating areas. All other forms of data acquisition and compilation will be performed by DNRE.

The result of all parties' efforts will be complete license specific forest data-bases containing all data necessary to formulate the 1992 forest management plans. These data-bases will be provided to each licensee, on suitable media, by January 1991.

STAND LEVEL FORECASTING

The 1992 management plan preparation will require stand level development forecasts for five general stand conditions:

Table 1. Data acquisition and data-base loading requirements for 1992 management plans.

Data Type	Source	Acquisition Responsibility	Acquisition Date	Loading Resposibility	Loading Date
Biological Description					
A. Merchantable stands					
(1) volume/species/structure	FDS	-	Complete	-	complete
(2) condition (vigor)	satellite imagery	TMB		TMB	
	defoliation survey	TMB		TMB	
	PSP's	Lic./Region		TMB	
B. Post 1982 cuts, plantations and spacings	annual reports	Lic.		TMB	
	5th year surveys	Lic.		TMB	
C. Pre 1982 natural and managed regeneration	aerial/ground surveys, sampling and stratification	Lic.		TMB	
D. Pre/Post harvest transition	5th year surveys geological maps	Lic.		TMB	
E. Site quality		TMB		TMB	
Land Availability					
A. Operationally inaccessible	topographic maps	Lic./Region		TMB	
B. Legal committments to non-timber use	lease and reserve maps	Lands F & W		TMB	
C. Riparian Buffers	F & W study Regional Biologists	F & W Regional Biologist		TMB	
D. Deer Wintering Area Management Units	F & W/Regional DWA Surveys	F & W Regional Biologist		F & W	
E. Wildlife Management Zones	legal boundary description	F & W		F & W	

(1) managed stands including plantations and softwood and mixedwood spacings;
(2) unmanaged naturally regenerating cut-overs;
(3) existing merchantable stands managed under an even-aged regime;
(4) existing merchantable stands managed with partial harvesting under an uneven-aged regime and;
(5) the transition between pre-harvest stand condition and post-harvest stand composition and structure.

In addition to the information required to initialize stand conditions for forecasting purposes, suitable models must be available with which to make the forecasts themselves.

The necessary stand forecasts can be performed with the use of five distinct models: (1) establishment phase model; (2) growth phase model; (3) stable/decline phase model; (4) uneven-aged model and (5) disturbance transition model. The relationship between these models and the forecasting requirements to which they are relevant is summarized in Table 2.

Table 2. Relationship between models and stand forecasting requirements.

Stand Condition	Models				
	Establishment	Growth	Decline	Uneven Aged	Transition
(1) managed	X	X			
(2) natural cut-overs	X	X	X		X
(3) even-aged merchantable		X	X		
(4) uneven-aged suitable for partial harvest				X	
(5) Pre/post cut transition					X

Considerable effort has been initiated to develop the five necessary models and the work underway has been scheduled to provide these models in working form by the autumn of 1990.* While it is not expected that the licensee contribute directly to design, coding, and verification of these models, it is expected that the Licensee make informed and systematic use of these in development of stand level forecasts for each respective License. This includes: (1) use of appropriate inventory information to accurately initialize the models; (2) logical stratification of stands into classes for which forecasts will be made; (3) recording of important stand characteristics in time-related sequences; and (4) entry of these forecasts into the appropriate forest level management models.

Yield forecasts for each of the stand types identified in Table 2 will be characterized by the parameters specified in Table 3.

Table 3. Parameters by which stand development is characterized.

1. Volume by species	6. Timeframe of suitability for deer wintering cover.
2. Mean piece-size	7. Timeframe of suitability as mature softwood habitat.
3. Log content (15 cm top specification)	
4. Percent softwood by volume	
5. Limits to operability	

* In the undesirable event that the developed models perform unsatisfactorily, the 1987 stand forecasting methodology will be used as the fallback alternative.

FOREST CHARACTERIZATION

The data presented in Table 1 provide the basis for characterizing the forest on each license for development of the management plan. Characterization will be performed in consideration of both biological (stand condition) and physical (location and availability) attributes. The concept is to aggregate stands into classes so that each constituent stand is similar to the others in its own class on the basis of biological and physical characteristics. Biological similarity equates to similarity with respect to growth, product yield, habitat suitability and silvicultural opportunity. Physical similarity equates to similarity with respect to availability for harvest and geographic location within identified management units.

The rules by which stands are assigned to classes are left to the licensee to define and substantiate, but at minimum, they must include the biological and physical factors outlined in Table 4. These rules must be supplied to DNRE and can be performed against the inventory at either DNRE or Licensee facilities.

Table 4. Biological and physical criteria for forest characterization.

Biological	Physical
Species Composition	Operationally inaccessible
Growth Rate (Stand Condition)	Riparian Buffer
	Legal Reserve
Site Quality (Fertility)	Deer Wintering Area
Harvest Transition	
Suitability For Partial Harvesting - two pass even-aged - uneven aged cutting cycle	
Silviculture Suitability - Planting - Spacing - Commercial Thinning	

FOREST LEVEL FORECASTS

Forest level forecasts will be made using the forest characterization and stand yield forecasts prepared in previous steps. Forest level models will be made available to the licensee or the licensee may select some alternative model, provided it is deemed acceptable by DNR.

Two general model types will be made available: (1) Even-aged model and uneven-aged model. The former will accommodate clear-cut harvesting, two pass selection harvesting, planting, spacing, and commercial thinning. It will operate on predefined yield patterns and simple yield responses for thinning and partial stand removal. The uneven-aged model will support analysis of true uneven-aged management, where stands are partially harvested on a cutting cycle basis. The nature and intensity of harvest and makeup of the residual stand will govern stand yield responses. To account for this, the uneven-aged forest model will not be driven by pre- defined yields, but rather will contain a stand table based growth model which will forecast stand yield responses within an overall forest level analysis.

Working versions of both models will be made available to Licensees and both will be used in management plan design and evaluation. The licensees' responsibility will be to make use of both models for appropriate stand types to analyse the full array of management opportunities possible under even and uneven-aged management.

MANAGEMENT DESIGN

Once the forest data base is complete, forest characterization is performed, and once stand and forest level models are in place, the stage is set for development of the management alternatives and selection of a specific strategy.

The principle behind management design will be to examine a wide array of management alternatives and to clearly reveal the implication of each alternative in terms of important forest level outputs.

The management alternatives will be defined by specific combinations of inputs and the management performance will be defined by a specific set of output indicators. To be as comprehensive and innovative as possible, the input combinations should encompass as wide an array as practical given the make-up of the forest on the license. Because the selection of a specific strategy for implementation will inevitably involve some trade-off between interests, it is important that the outcome of each combination of inputs be specifically defined in terms of key indicators. This will make the nature of potential trade-offs explicit and provide a basis for selection of appropriate action. Based on the results associated with each alternative, and DNRE and licensee objectives, the most appropriate strategy will be selected for implementation.

Table 5 lists the minimum set of input combinations which must be evaluated in the plan development and Table 6 lists the minimum set of output indicators which must accompany each management alternative.

Table 5. Input factors to be examined in management plan development.

SILVICULTURE
- Planting - amount, priority criteria, species
- Spacing - amount, priority criteria
- Commercial Thinning - amount, priority criteria

HARVEST
- Clear-cut - amount, priority criteria
- Partial-cut - amount, priority criteria, type

Table 6. Output indicators to be evaluated for management plan alternatives.

TIMBER
- Sustainable fibre supply and volume by source and harvest method
- Log supply for current specifications
- Mean tree size profile
- Fallout species profile
- Silviculture cost

HABITAT
- Forest composition profile (area by S, SH, HS, H covertypes and age classes)
- Area in mature softwood habitat condition
- Area in DWA habitat per DWA management unit over-time.

Each licensee's management plan should evaluate the various combinations with each of these input factors varied across levels which are reasonably possible given the nature of the forest on the license.

MANAGEMENT EVALUATION PROCESS

Once analysis of management alternatives for the license has been performed, the license will submit all results and identify and propose, in decreasing order of preference, three specific strategies for implementation. The proposals should be accompanied by discussion of how each one serves DNRE and licensee objectives and the nature and extent of trade-offs (with respect to Table 6 indicators) each strategy entails.

Upon submission of this package DNRE will evaluate phase one of the planning process and if approved, the most appropriate strategy will be selected for implementation. Once agreement is reached on the strategy to be implemented, the licensee will proceed to geographically map the harvest, spacing, and thinning components of the plan.

GEOGRAPHIC LAY-OUT

Using the wood supply based harvest schedule as a guide, harvest block lay-out will be performed in consideration of the following:

1. Each block will be given a unique 9 digit number, preceeded by region and license;
2. Sufficient blocks will be formed to generate harvest at the selected harvest rate for a minimum of 25 years or until such time as the point of minimum softwood growing stock is reached up to a maximum of 35 years;
3. To the extent possible, blocks will be configured to reflect operational factors;

4. Blocks will be identified with respect to the items listed in Table 7.

5. For each block created, all resident stands, or parts thereof will be recorded.

6. Block size is to be less than or equal to maximum opening guidline size (which are currently be established by DNRE).

7. Adjacent blocks should be identified and assigned as attributes for each block.

Two electronic data files should be created during the blocking process - a block file, and a stand file. The file contents are listed in Table 7.

Table 7. Block and stand file contents.

Block File	Stand File
1. Region	1. Map #
2. License	2. Stand #
3. Block #	3. Block #
4. Map #	4. Area in block
5. Area (ha)	5. Harvest volume by species group (by period)
6. Type of harvest (clear-cut or selective)	6. Suitability as mature softwood habitat (by period)
7. Deer Wintering Area Management Unit Number	
8. Supply run (SW or HW)	
9. Harvest volume by species group (by period)	
10. Suitability as mature softwood habitat (by period)	
11. Suitability as DWA habitat	
12. List of adjacent block numbers	

Once blocking is complete and the block and stand files are created, the licensee will proceed to sequence the blocks for harvest. Block sequencing will be organized into seven periods, each containing five years of harvest. The guidelines listed in Table 8 should be employed in the block sequencing process.

Table 8. Block sequencing guidelines.

1. A minimum harvest delay must be maintained between adjacent harvest blocks which comprise a total area exceeding a specified maximum opening. This requirement is currently under review and guidelines will be forth coming.
2. The periodic distribution of harvest by partial and clear-cut harvesting, identified in the management strategy must be maintained.

To ensure the operational practicality of the spacing and thinning components of the silviculture effort, the first five years of both activities should be geographically identified. The 5th year surveys and pre-82 regeneration survey should provide a reasonable information source from which to select appropriate areas for spacing.

The resulting configuration from the geographic lay-out and block sequencing process should be entered into the wood supply forecasting model to reveal the wood supply and habitat out-put indicators for the final, mapped management plan. The volume availability forecast in this final run will define the actual harvest levels to be implemented on the license.

APPENDIX 2.

DESCRIPTION OF THE FOREST DEVELOPMENT SURVEY (FDS) VARIABLES: FOREST UNIT, DEVELOPMENT STAGE.

FDS VARIABLES

Forest Unit (FU)

SPBF	spruce-balsam fir	(SP component includes red, black and white spruce)
BFSP	balsam fir-spruce	
SPIH	spruce-intolerant hardwood	(IH component is primarily aspen and white birch)
IHSP	intolerant hardwood-spruce	
SPTH	spruce-tolerant hardwood	(TH component is primarily sugar and red maple, beech and yellow birch)
THSP	tolerant hardwood-spruce	
BFIH	balsam fir-intolerant hardwood	
IHBF	intolerant hardwood-balsam fir	
BFTH	balsam fir-tolerant hardwood	
THBF	tolerant hardwood-balsam fir	
OTSW	other softwood	(OTSW is primarily eastern white cedar)
PINE	pine	(PINE is primarily jack pine)
INHW	intolerant hardwood	
TOHW	tolerant hardwood	
IHTH	intolerant-tolerant hardwood	
THIH	tolerant-intolerant hardwood	
MSP	SPTH, SPIH, THSP, IHSP	
MBF	BFTH, BFIH, THBF, IHBF	

Development Stage (DS)

CUT (C)	Clear-cuts and cuts where residual volume form less than 20% crown closure.
REGENERATING (R)	Stands where tree height is approximately 3 metres.
YOUNG (Y)	Stands that are accumulating wood volume at a rapid rate.
IMMATURE (I)	Stands that are still accumulating volume at a reasonable rate but that are older than Y stands and have not yet reached maturity.
MATURE (M)	Stands that are no longer accumulating volume: volume loss due to tree mortality approximately equals volume growth of remaining trees.
OVERMATURE (O)	Stands that are losing volume at a rapid rate: volume loss due to tree mortality exceeds volume growth of remaining trees.

APPENDIX 3.

PROPOSAL TO THE CANADA/NEW BRUNSWICK COOPERATIVE AGREEMENT ON FOREST DEVELOPMENT, PROJECT 5.1

CANADA/NEW BRUNSWICK COOPERATIVE AGREEMENT
ON FOREST DEVELOPMENT

PROJECT 5.1

GENERAL INFORMATION

Activity Title:	Application and Evaluation of Habitat Supply Analysis
Agency:	Department of Natural Resources and Energy, Fish and Wildlife Branch
Contact Person:	Michael J.D. Sullivan Program Leader, Forest Land Habitat Management Program
Telephone:	(506) 453-2440
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Submission Date:	3 October 1990

PROPOSED ACTIVITY

Background

The Forest Land Habitat Management Program (FLHMP), of the Department of Natural Resources and Energy (DNRE), has developed Habitat Supply Analysis (HSA) procedures to allow the integration of wildlife habitat objectives into the forest management planning process. The goal of the program is to ensure that sufficient habitat is available on New Brunswick's forest land to support viable populations of all forest-dwelling species and to maintain desired populations of selected species.

Habitat Supply Analysis makes use of DNRE's geographically referenced forest database and its timber supply and wildlife habitat models to predict the availability of various types of habitat through the forest management planning horizon. The models are based on assumptions about vegetative structures of forest stands, changes in structure resulting from natural succession and (or) logging, and on use of vegetative structures by wildlife species.

Analyses of 1987 Forest Management Plans for New Brunswick Crown Land Licenses project a significant depletion of the mature coniferous component of the Crown forest; habitat management activities have therefore initially been concentrated in this area. Future management will not be limited to mature coniferous forest. Analyses of the requirements for mature coniferous forest were based on the habitat requisites of the American marten, a species requiring a relatively large area of this forest type.

Mature coniferous forest is also required as wintering habitat for white-tailed deer. Winter habitat use by white-tailed deer involves selection for both vegetative structure and the location of stands. Deer are traditional in their use of winter habitat in that they return to the same wintering area each year. For this reason, maintenance of winter habitat is best achieved through intervention within, and in proximity to, existing wintering areas. To that end, known deer wintering areas (DWA) and accompanying management units (DWAMU) have been identified on the geographically referenced forest database. Separate management plans will be developed for each DWAMU from which the associated timber harvest levels will be included in the wood supply for the license.

Watercourse buffer strips, ecological reserves, parks, freehold lands, and the operationally inaccessible areas all contribute to the amount of habitat available.

Program activities are further discussed in the document, "New Brunswick Forest Land Habitat Management Program - Progress Report March 1990" (Appendix 1). The implementation of HSA procedures begins in January 1991 with the development of Forest Management Plans for Crown Land Licenses, as outlined in the document, "Crown License Forest Management Planning Process" (Appendix 2).

Objectives

The objective is to evaluate HSA procedures as a planning tool to ensure wildlife habitat objectives are being met. This would involve the following steps:

1) To assist with incorporation of HSA in the development of forest management plans for each Crown Timber License.

2) Ground verification of predicted model parameters, namely vegetative structure and intensity of animal use. This information will be used for refinement of the habitat relationships in the models.

3) Ground verification of proposed harvest blocks, to ensure that stands queued for harvest are in the proper sequence. This step is presently done with wood supply modelling to ensure the oldest stands are harvested first. For HSA this step will include verification of both stand condition and intensity of animal use.

The proposed activity will enable forest wildlife habitat to be managed on a sustainable basis while providing a predictable supply of wood fibre. Having the trade-offs quantified between wildlife habitat and wood supply will allow for more informed management decisions to be made. The activity relates to objective 3 of sub-section 2.2 of the Canada/New Brunswick Cooperative Agreement on Forest Development, which is, in part: "To support effective and efficient forest management activities by developing integrated resource management guidelines". Specific references to program objectives are given in Appendix 3.

Description

The FLHMP proposes to engage four (4) biologists to assist in forest management plan development and to evaluate HSA model predictions. Activities will be coordinated through the FLHMP; however activity biologists will be located at 4 of the DNRE Regional Headquarters and will work closely with the Regional biologists. Activity biologists will be assigned to licenses rather than to DNRE Regions, based on the amount of Crown Land and the predicted work load to implement HSA in each license. On this basis, the proposal is to assign Activity biologists to each of the following license groups: (1 & 2), (3, 4 & 5), (6 & 7) and (8, 9 & 10). As this will be an ongoing project, funding is requested for the period of 1 January 1991 to the end of the Agreement, 31 March 1994.

Plan Development. The inclusion of wildlife habitat goals in forest level planning is a new process. The methodology for the process is being developed by the FLHMP, in coordination with the Forest Management Planning Section of Timber Management Branch. The actual development of plans, however, remains a responsibility of each Crown Land licensee. Plans will be developed separately for each DWAMU and for the rest of the "regular" forest.

Initially, plans will not be spatially referenced, in that harvest levels, wood supply and habitat supply will be reported for the license as a whole. Activity biologists will assist Licensee foresters in the use of HSA models and in the development of forest management plans. An important component of this is the evaluation of alternative

management strategies from the perspective of wildlife habitat supply.

After acceptance of Licensee non-spatial plans by DNRE, the first 35 years of the plan will be spatially referenced. All proposed harvest blocks and all blocks proposed as supplying required habitat will be indicated on Forest Development Survey base maps. This is the planning task for which assistance from Activity biologists is most required. The value of a forest stand to wildlife depends not only on its vegetative structure but also on its location with respect to other stands of similar or contrasting structures. Activity biologists will work with DNRE Regional biologists and assist Licensee foresters with the locating and scheduling of harvest blocks to ensure that spatial requirements of wildlife habitat are being met. It is likely that careful spatial planning of harvest can significantly improve the availability of habitat with minimal effects on the availability of wood fibre.

HSA Verification. The wood supply models used in forest management planning are based on assumptions about temporal changes in vegetative structure and, consequently, changes in merchantable volume, for various forest strata. Habitat supply models operate on the principle that "windows in time" exist when appropriate strata provide suitable habitat for given wildlife species; they are based on assumptions about the use of different vegetative structures by wildlife species.

Errors in model parameters at either the wood or habitat modelling level can cause erroneous reporting of the availability of habitat. Activity biologists will therefore be responsible for the ongoing verification of the predictions of habitat supply models. This requires ground verification of structures of stands predicted to be of high habitat value and, (2) ground verification of animal use of stands, particularly within DWAMUs. A third component is ground verification of proposed harvest blocks, particularly within DWAMUs, to ensure that stands are harvested in a suitable order with respect to wildlife activity.

Performance Measurement Criteria

The measure of performance will be the successful implementation of HSA procedures on all Crown Land Licenses in accordance with the timetable given in the document, "Crown Forest Management Planning Process" (Appendix 2). Progress reports will be supplied to the Coordinating Committee as requested.

FINANCIAL

PROPOSED BUDGET

YEAR 1 (February to March 1991)	
Salaries	
($35,000 x 4) / (2 months)	$23,333
Expenses (travel, lodging)	
($3,000 x 4) / (2 months)	$2,000
Vehicles (leasing)	
($9,600 x 4) / (2 months)	$6,400
Vehicles (fuel)	
($2,400 x 4) / (2 months)	$1,600
Computers (hardware and software)	
4,000 x 4	16,000
TOTAL Year 1	49,333
YEARS 2, 3 and 4 (April to March, 1991-92, 1992-93 and 1993-94)	
As for Year 1, but excluding computer costs.	
TOTAL Year 2	200,000
TOTAL Year 3	200,000
TOTAL Year 4	200,000
TOTAL 38-MONTH BUDGET	649,333

APPENDIX 1 (of Appendix 3).

NEW BRUNSWICK FOREST LAND HABITAT MANAGEMENT
- PROGRESS REPORT MARCH 1990

APPENDIX 2 (of Appendix 3).

CROWN LICENSE FOREST MANAGEMENT PLANNING PROCESS

(See Appendix 1 of this Progress Report)

APPENDIX 3 (of Appendix 3).

RELATIONSHIP OF PROPOSED ACTIVITY TO
AGREEMENT PROGRAM OBJECTIVES

RELATIONSHIP OF PROPOSED ACTIVITY TO AGREEMENT PROGRAM OBJECTIVES

The proposed activity relates to objective 3 of sub-section 2.2 of the Canada/New Brunswick Cooperative Agreement on Forest Development, which is, in part: "To support effective and efficient forest management activities by developing integrated resource management guidelines". More specifically, the proposed activity relates to the following Program objectives, from Schedule "B" of the Agreement:

Program 3 — Forest Management on Crown Lands - "to contribute to the attainment of integrated resource management objectives".

Program 5 — Applied Research and Development, Planning, Technology Transfer, Human Resource Development and Integrated Resource Management - "to develop integrated management strategies and practices to enhance and encourage multiple use of forestry/wildlife resources".

Component 5.2 — Planning - "The current commitment to forest management ... necessitates careful resource planning and identification of opportunities for improving current planning practices".

Component 5.5 — Integrated Resource Management - "This sub-program will provide funding for activities including, but not limited to, forestry-wildlife habitat investigations; development of forest management practices which will promote habitat conditions conducive to the well-being of wildlife species (including operational trials); ...".

APPENDIX 4.

NEW BRUNSWICK FOREST RESEARCH ADVISORY COMMITTEE (NBFRAC): NBFRAC WILDLIFE TECHNICAL COMMITTEE

NEW BRUNSWICK FOREST RESEARCH ADVISORY COMMITTEE (NBFRAC)

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APPENDIX 5.

A FRAMEWORK FOR APPLIED WILDLIFE RESEARCH

A FRAMEWORK FOR APPLIED WILDLIFE RESEARCH

prepared for the NBFRAC
Wildlife Technical Committee by:

D. Beaudette, DNRE, Fish and Wildlife Branch
C. Frame, DNRE, Timber Management Branch
G. Godin, DNRE, Region 1
M. Sullivan, DNRE, Fish and Wildlife Branch
K. Topolniski, Fraser Inc.

3 August 1990

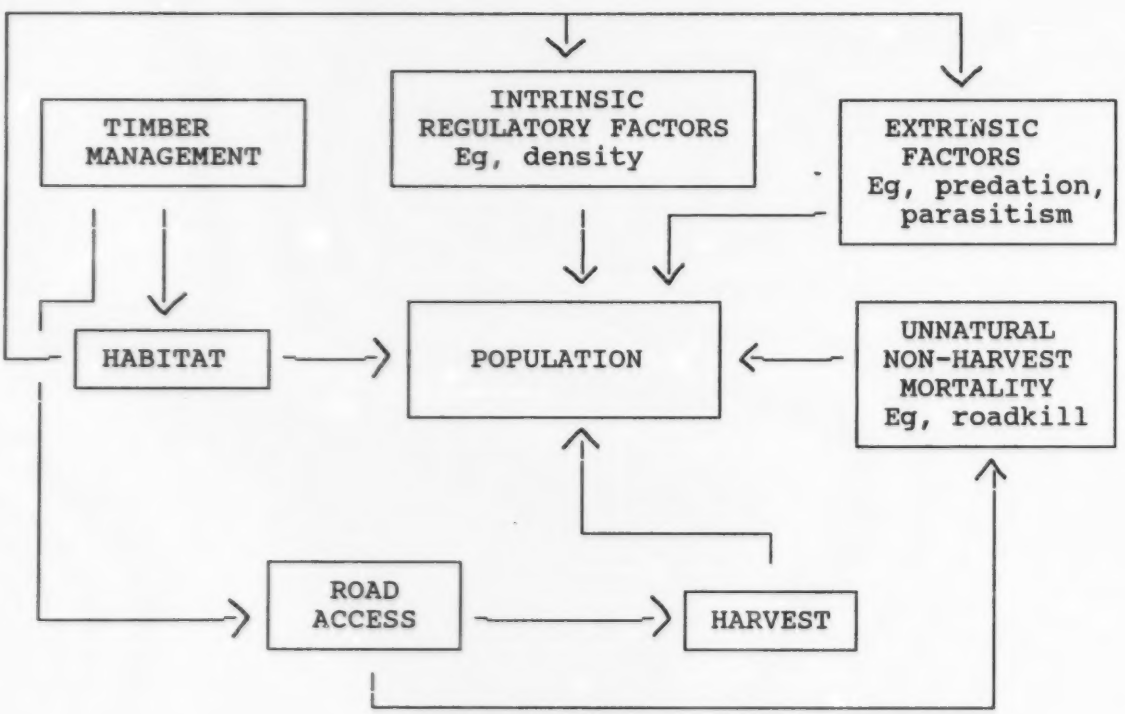
FOREWORD

At the March 1990 meeting of the Wildlife Technical Committee (WTC) of the New Brunswick Forest Research Advisory Committee, a need was identified to describe the framework by which the WTC will advise on priorities for applied wildlife research in New Brunswick. To that end, a subcommittee was selected to draft the framework. Subcommittee members were D. Beaudette, C. Frame, G. Godin, M. Sullivan and K. Topolniski.

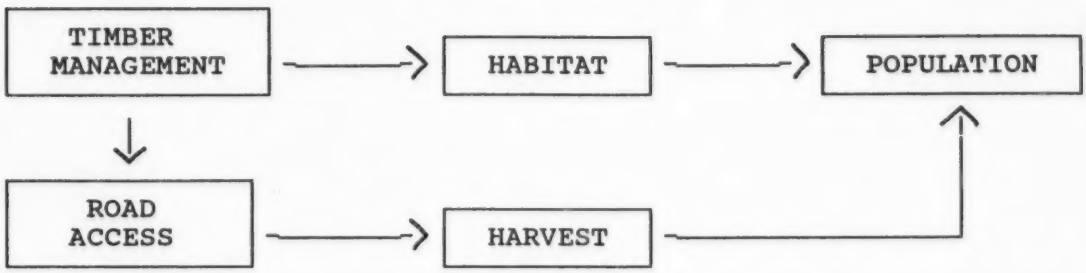
A FRAMEWORK FOR APPLIED WILDLIFE RESEARCH

The goal of wildlife management is to regulate population size. Predictions about the effects of management interventions on populations are made using information on the status of the population and on the relative effects of factors that influence it. The purpose of applied wildlife research is to reduce the uncertainty of information upon which management decisions are made.

Population size is influenced by the following relationships:



The role of the Wildlife Technical Committee is to advise on research and development requirements in the area of integrated timber and habitat management. The appropriate relationships are:

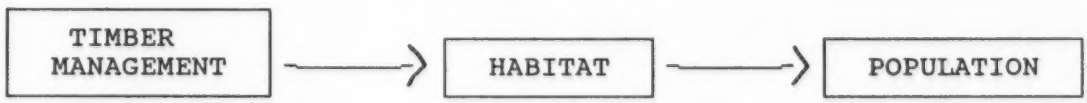


The influence of timber management on populations via changes in habitat is more important than is its influence via changes in road access. This is because:

1. Habitat is a fundamental requirement of wildlife; control of access will not maintain a population if habitat is not available.

2. Timber management has a direct and significant influence on habitat availability, but it is only one of the many factors that influence harvest pressure.

The Committee should therefore primarily consider the following relationships:



This framework consists of two principal components, corresponding to the two relationships depicted in the above flow chart. They are (1) the influences of stand structure and forest composition (habitat) on population size and, (2) the influences of timber management activities on habitat quantity and quality. Each component is described in the following sections. However, the first step towards determining the value of a proposed research topic is to determine whether the species selected for the work is (are) appropriate. Prioritization criteria, in order of importance, are:

1. Forest Impact: Species associated with habitat types likely to change markedly as a result of forest operations. Species that are identified as having strong associations with forest classes that are predicted to be in short supply are of highest priority.

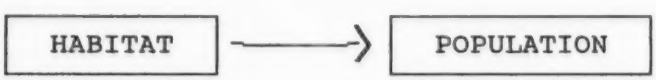
2. Public Demand: Species upon which the public places a high demand for, e.g., hunting, trapping and viewing.

3. Indicator Species: Species with habitat associations representative of a group of species.

4. Prey Species: Species that constitute a major proportion of the diet of species at higher trophic levels.

5. Distribution: Species with wide occurrence across the province.

A species list with rankings in each of these criteria is being prepared and will be distributed to Committee members.



There are both stand and forest level questions about the influence of habitat on forest wildlife populations.

Stand Level

Stand level questions, in order of priority, are:

1. What is a qualitative description of habitat? This can be subdivided into:

   A. What are the feeding, breeding and shelter requirements of the species?

   B. What are the structural features of forest stands that supply these requirements? (e.g., understory/ overstory species composition and density, crown closure, snag abundance)

2. What is a quantitative description of habitat? This can be subdivided into:

   A. Can carrying capacity be associated with availability of certain structural features?

   B. Are data on availability of important structural features available in current forest development databases (e.g., Forest Development Survey, Permanent Sample Plots, Forest Site Classification)?

C. If not, can their availability be reliably associated with data that <u>are</u> in current databases?

D. If answer to (C) is negative, how can data on availability of important structural features be collected?

3. Can availability of important structural features be reliably forecasted?

<u>Forest Level</u>

Answers to forest level questions yield a spatial definition of habitat. They are, in order of priority:

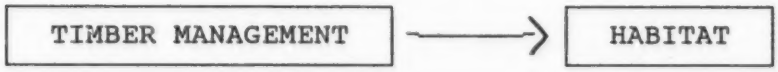
1. What are current population levels?

2. How many resident individuals are required to sustain a viable population?

3. What are appropriate relative abundances of habitat components (e.g., summer and winter range for white-tailed deer)?

4. What are suitable spatial arrangements of habitat components (e.g., habitat block size, inter-block distance)?

5. What is the habitat area required per individual?



The activities which comprise timber management are together the greatest single influence on the supply of forest habitat. There are concerns about how both operational (stand) and planning (forest) level activities influence habitat for wildlife.

<u>Stand Level</u>

1. Can stand structures suitable for habitat be described in terms suitable for the planning of timber harvest and silviculture operations?

2. What forestry operations can be used to create desired stand structures?

Forest Level

1. How can long-term forest planning techniques be modified to provide better integrated management of timber and wildlife habitat?

APPENDIX 6.

FOREST LAND HABITAT MANAGEMENT PROGRAM
PROGRAM STAFF

FOREST LAND HABITAT MANAGEMENT PROGRAM

PROGRAM STAFF

POSITION	NAME	STATUS
Program Leader (DNRE)	M. Sullivan	Permanent
Habitat Relationships Leader (DNRE)	D. Beaudette	Permanent
Habitat Relationships Biologist (WHC)	J. Niederleitner	Contract
Habitat Relationships Biologist (DNRE)	S. Lusk	Contract
Habitat Coordination Leader (DNRE)		Vacant
Habitat Coordination Biologist (WHC)	S. Gordon	Contract
Computer Systems Leader (DNRE)	L. Vietinghoff	Permanent
Computer Systems Specialist (WHC)	J. Feltmate	Contract